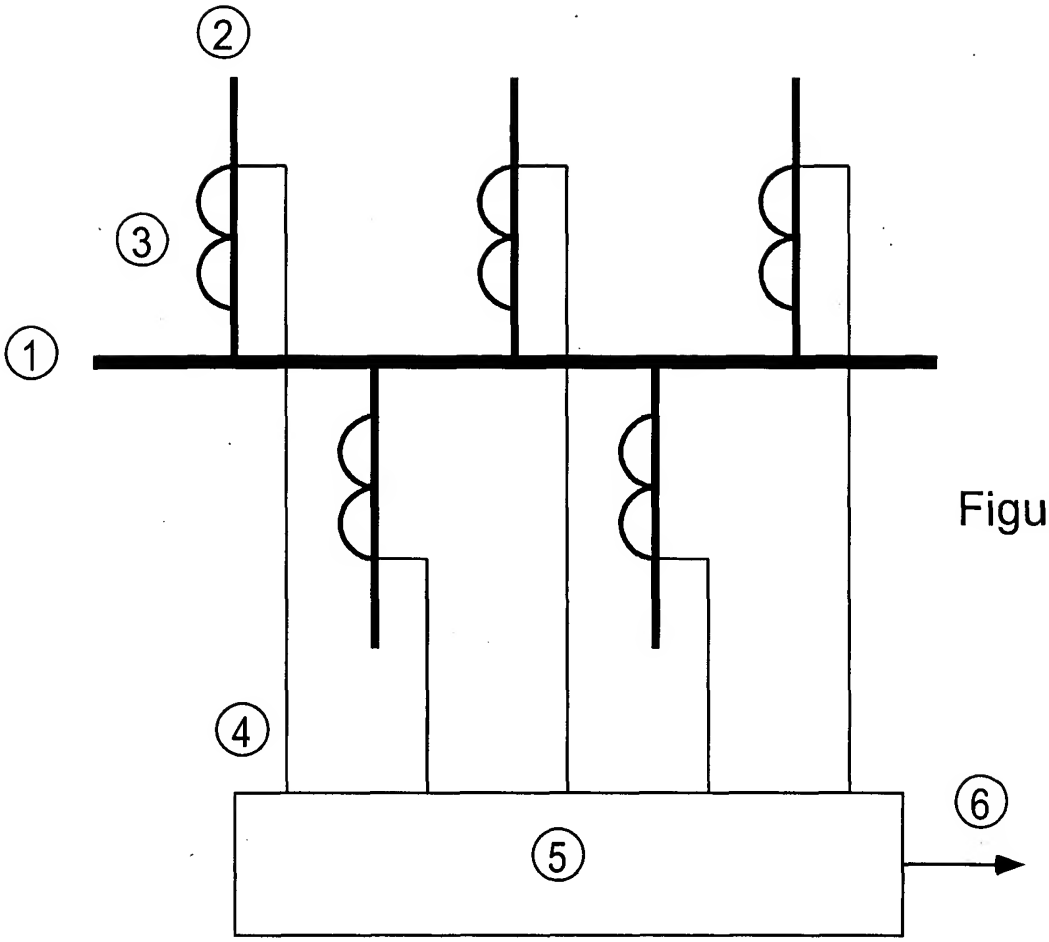

Figure 1

1. bus being protected (one of three phases shown)
2. feeder into bus (one of three phases shown)
3. current transformer set (one of three phases shown)
4. connection from current transformer to protective relay (one of three phases shown)
5. protective relay
6. trip signal decision

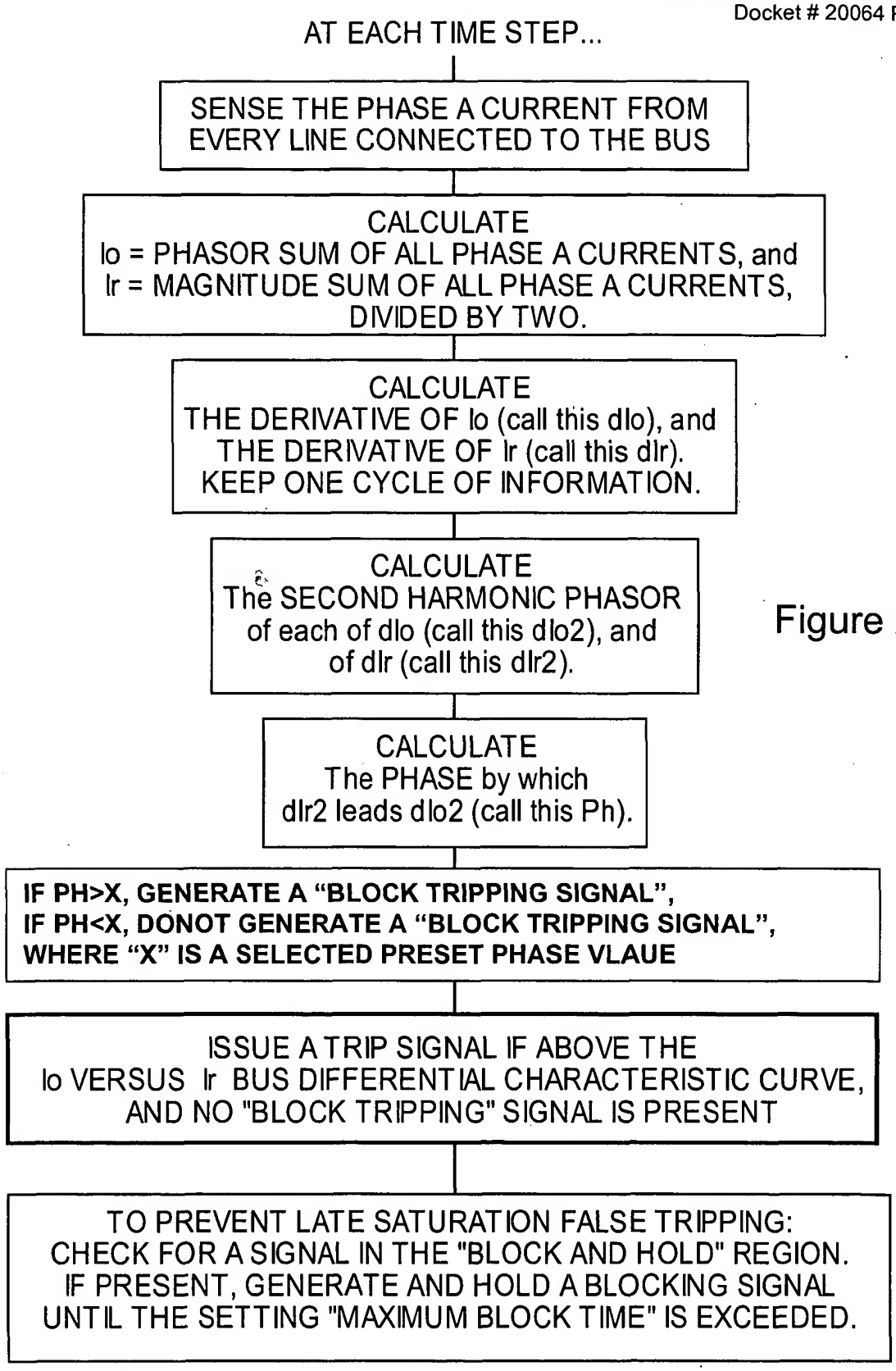
AT EACH TIME STEP...
SENSE THE PHASE A CURRENT FROM EVERY LINE CONNECTED TO THE BUS
CALCULATE
Io = PHASOR SUM OF ALL PHASE A CURRENTS, and
Ir = MAGNITUDE SUM OF ALL PHASE A CURRENTS, DIVIDED BY TWO.
CALCULATE
THE DERIVATIVE OF Io (call this dIo), and
THE DERIVATIVE OF Ir (call this dIr).
KEEP ONE CYCLE OF INFORMATION.
CALCULATE
The SECOND HARMONIC PHASOR
of each of dIo (call this dIo2), and
of dIr (call this dIr2).
CALCULATE
The PHASE by which
dIr2 leads dIo2 (call this Ph).
IF PH>X, GENERATE A "BLOCK TRIPPING SIGNAL",
IF PH<X, DONOT GENERATE A "BLOCK TRIPPING SIGNAL",
WHERE "X" IS A SELECTED PRESET PHASE VLAUE
ISSUE A TRIP SIGNAL IF ABOVE THE
Io VERSUS Ir BUS DIFFERENTIAL CHARACTERISTIC CURVE,
AND NO "BLOCK TRIPPING" SIGNAL IS PRESENT
TO PREVENT LATE SATURATION FALSE TRIPPING:
CHECK FOR A SIGNAL IN THE "BLOCK AND HOLD" REGION.
IF PRESENT, GENERATE AND HOLD A BLOCKING SIGNAL
UNTIL THE SETTING "MAXIMUM BLOCK TIME" IS EXCEEDED.

Figure 2

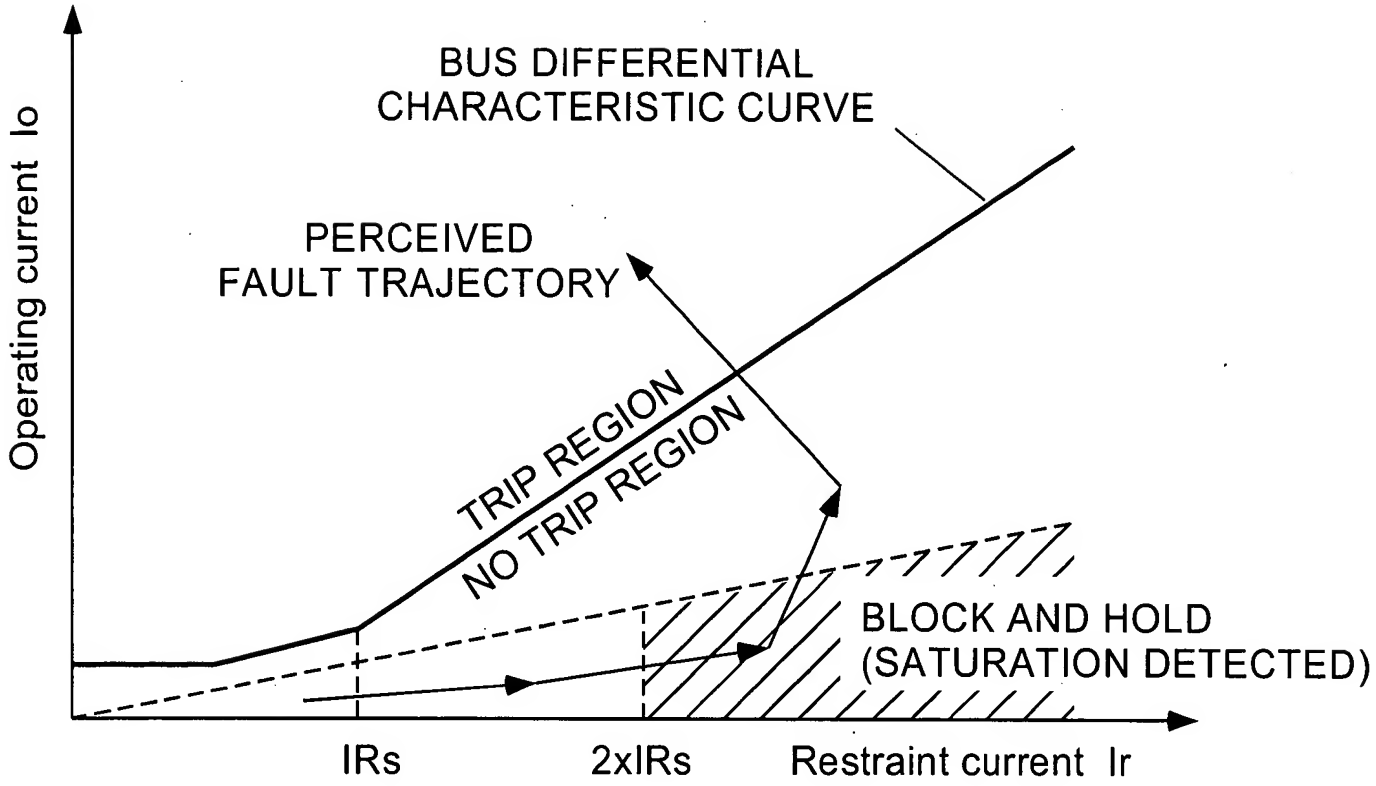
BUS DIFFERENTIAL
CHARACTERISTIC CURVE
PERCEIVED
FAULT TRAJECTORY
TRIP REGION
NO TRIP REGION
BLOCK AND HOLD
(SATURATION DETECTED)
Operating current Io
IRs
2xIRs
Restraint current Ir

Figure 3